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Novi senzor na bazi MWCNT za određivanje oksifluorfena tehnikom diferencijalne pulsne striping voltametrije

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Elektroda od staklastog ugljenika (GC) modifikovana pomoću MoO_2-MWCNT je primenjena kao elektrohemijski senzor za određivanje koncentracije oksifluorfena u modelnim vodenim rastvorima pomoću tehnike diferencijalne pulsne striping voltametrije (DPSV). Po prvi put je ispitivana elektrohemijska detekcija ovog intenzivno korišćenog herbicida u troelektrodnom sistemu. Komercijalno dostupne MWCNT su hemijski impregnirane sa natrijum-molibdat dihidratom i nanešene na GC koja je korišćena kao radna elektroda. Pretpostavlja se da su strukturne i elektronske/elektrohemijske karakteristike dobijenog materijala odgovorne za poboljšani elektrodni odziv u slučaju detekcije oksifluorfena. Pravilna raspodela MoO_2 u strukturi MWCNT je potvrđena TEM mikroskopom. Oksifluorfen je određivan pomoću DPSV u rasponu koncentracija od 2,5 do 34,52 ng cm^{-3}, sa r^2 = 0.998 i granicom detekcije od 1,52 ng cm^{-3}, dok relativna standardna devijacija (RSD) nije prelazila 2.4 % što ukazuje na relativno dobru preciznost razvijene metode sa potvrđenom reproduktivnošću. U laboratorijskom istraživanju potvrđen je novi pristup u brzoj i pouzdanoj detekciji oksifluorfena.

Novel MWCNT based sensor for oxyfluorfen determination by the differential pulse stripping voltammetry

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A glassy carbon electrode modified with MoO_2-MWCNTs was constructed and applied as electrochemical sensor for the determination of oxyfluorfen in model aqueous solutions by the means of differential pulse stripping voltammetry (DPSV). For the first time, this widely used herbicide was electrochemically investigated in three electrode system. As a working electrode agent, commercially available MWCNTs were chemically impregnated by the sodium molybdate dihydrate. It is supposed that structural and electronical/electrochemical features of the obtained material are responsible for enhanced electrodic response in the case of oxyfluorfen sensing. Proper distribution of MoO_2 in the structure of MWCNTs was confirmed by TEM. Oxyfluorfen was determined by DPSV in the concentration range from 2.5 to 34.52 ng cm^{-3}, with r^2 = 0.998 and the limit of detection of 1.52 ng cm^{-3}, while the relative standard deviation (RSD) did not exceed 2.4 % which indicates a relatively good precision of the developed method with confirmed reproducibility. A novel approach in rapid and reliable oxyfluorfen detection is confirmed in laboratory study.